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RESEARCH ARTICLE

The Impact of Policy Incentives on Long-Term Care Insurance and Medicaid Costs: Does Underwriting Matter?

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Objective. To test whether underwriting modifies the effect of state-based incentives on individuals' purchase of long-term care insurance.
Data Source. Health and Retirement Study (HRS), 1996–2012.
Study Design. We estimated difference-in-difference regression models with an interaction of state policy indicators with individuals' probabilities of being approved for long-term care insurance.
Data Extraction. We imputed probabilities of underwriting approval for respondents in the HRS using a model developed with underwriting decisions from two U.S. insurance firms. We measured the elasticity response to long-term care insurance price using changes in simulated after-tax price as an instrumental variable for premium price.
Principal Findings. Tax incentives and Partnership programs increased insurance purchase by 3.62 percentage points and 1.8 percentage points, respectively, among those with the lowest risk (highest approval probability). Neither had any statistically significant effects among the highest risk individuals.
Conclusions. We show that ignoring the effects of underwriting may lead to biased estimates of the potential state budget savings of long-term care insurance tax incentives. If the private market is to play a role in financing long-term care, policies need to address the underlying adverse selection problems.
Key Words. Long-term care insurance, tax policy, Partnership program

Private insurance plays a small role in financing long-term services and supports in the United States. In 2012, those services cost nearly $220 billion, or 9 percent of all health spending; of this, 61 percent was paid by Medicaid, the public safety-net program for the poor; 22 percent was out of pocket; and only 13 percent was covered by private insurance and other public sources (O'Shaughnessy 2014). State policy makers have taken steps to promote the purchase of private long-term care insurance (LTCI). The aim of such efforts is to bring

more private dollars into the long-term care system in order to reduce the growth in public spending for long-term care, to provide beneficiaries with increased access and independence, and to protect households from the financial risk of paying for extended need for long-term care. These priorities will only grow more urgent as the U.S. population ages. With the majority of LTCI policies being sold on the individual market, the voluntary LTCI market has lacked the broader risk pool that the employer-sponsored market has historically provided for health insurance. To combat losses from adverse selection, firms require would-be buyers to pass strict medical underwriting requirements. Those restrictions mean that LTCI is actually available only to a narrow slice of Americans who are not only wealthy enough to afford the premiums but also healthy enough to be at low risk of eventually needing the insurance. Underwriting practices put an upper bound on the potential for subsidies to increase the proportion of Americans who are covered by LTCI, and they subdue the offsets available from any increases that might occur: Approximately 40 percent of the U.S. population ages 50–70 would likely be disqualified from private long-term care insurance for medical reasons (Cornell et al. 2016).

Research generally suggests most policy incentives to increase LTCI purchase have modest effects. Those studies consider the pooled impact across individuals, regardless of their likelihood of gaining approval to purchase a policy via underwriting. Considering only the average effect of LTCI incentives does not recognize that a large portion of the target-age population has no opportunity to buy LTCI because they would fail underwriting review. In light of the need to better understand how underwriting modifies the impact of policy incentives, we estimated how two prominent LTCI subsidies, tax incentives and Partnership programs, operate in the context of the medical underwriting process.

BACKGROUND

Reasons for the low penetration in the market for long-term care insurance include both demand- and supply-side limitations, many of which are summarized by Brown and Finkelstein (2009). Consumers do not have a good

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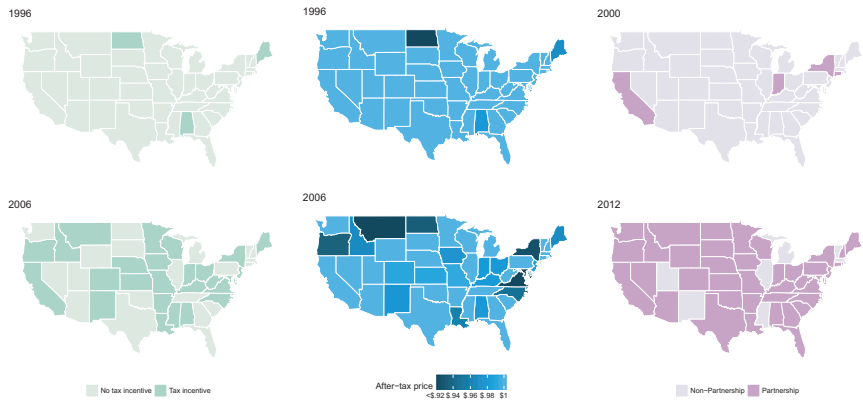
understanding of what public services are covered by public programs (LifePlans 2012). Many expect to rely on Medicaid, especially those whose assets are low enough that they may spend down to eligibility levels (Brown, Coe, and Finkelstein 2007; Brown and Finkelstein 2008). On the supply side, firms are beset by high transaction costs, imperfect competition, long-term dynamic contracting problems, and asymmetric information (Brown and Finkelstein 2007). The actuarial challenges of offering LTCI policies are uniquely difficult: insurers in early years underpriced premiums, incorrectly estimating how fast LTC costs would rise, how many buyers would use benefits, how few would let their policies lapse, and the low-interest rates that cut into profit margins. As Cutler (1996) argues, risk is intertemporal and aggregate, which differentiates this market from health insurance markets that can pool idiosyncratic risks cross-sectionally. As with any insurance market, consumer information about their risk of needing long-term care that is unknown to actuaries and not accounted for in premium calculations can cause the market to unravel. Insurers respond to the problem by gathering information on buyers to forecast their need for long-term care. Among those who apply for insurance, about 15–25 percent are disqualified (Cornell et al. 2016). Some firms offer differentiated pricing based on the applicant's underwriting score. In one survey, about half of firms offer at least one higher priced, substandard policy, with price markups ranging from 60 percent to 200 percent of the price of a policy in the preferred class (M. Cohen, personal communication, January 2017). Hendren's (2013) explanation for why high-risk buyers are shut out from insurance markets is that these higher risk consumers have more nuanced information about their own future long-term care needs than low-risk consumers or firms; the information asymmetry is effectively impossible to correct.

Federal and a growing number of state tax codes offer tax incentives to subsidize LTCI premiums. In 1997, the Health Insurance Portability and Accountability Act (HIPAA) allowed deductions of LTCI premiums for taxpayers who itemized their health expenditures. Also in the 1990s, states began passing tax credits and deductions for LTCI premiums; in 1994, only 1 state provided tax subsidies, and by 2016, 30 states had them.

Additionally, many states allow persons who purchase a qualified LTCI policy dollar-for-dollar asset protection, up to $100,000, if they use their benefits and subsequently apply for Medicaid. These rule changes, known as long-term care Partnership programs, effectively allow purchasers of Partnership-qualified policies to qualify for Medicaid sooner (with more assets) than if they had not bought LTCI. As of 2016, 43 states had either adopted a Partnership program or begun filing applications, and about two

Figure 1: Variation in State Policy Incentives for Long-Term Care Insurance [Color figure can be viewed at wileyonlinelibrary.com]



Notes. Column 1 maps depict the states with any state tax credit or deduction for long-term care insurance at the start and end of the study period, 1996 and 2006. Column 2 maps show the average of the simulated after-tax price of $1 of long-term care insurance. Column 3 maps depict LTCI Partnership states in 2000 and 2012.

in five new policies in force were Partnership-qualified (Nordman et al. 2016). Figure 1 shows the variation over time in the states with tax incentives, the average simulated after-tax price of LTCI premiums, and Partnership programs.

In this study, we examined how the response to tax subsidies and Partnership programs differed with individuals' probability of being offered coverage from LTCI firms. Our hypothesis was that in a market that excludes buyers on the basis of pre-existing health conditions, low-risk (healthier) individuals will be more responsive to price changes and asset-protection incentives than high-risk individuals simply because they are more likely to be offered any policy. By contrast, high-risk individuals are shut out of the market completely; so marginal changes in the price of insurance do not benefit the high-risk group. Therefore, the effect of adopting these programs should intensify among potential buyers that are more likely to be approved for insurance in the private, individual market.

Prior analyses of tax subsidies for long-term care have used a difference-in-differences approach to examine the effect of tax subsidies (Stevenson, Frank, and Tau 2009; Goda 2011) and Partnership programs (Greenhalgh-Stanley 2012; Lin and Prince 2013, 2016) on individuals' purchase of long-

term care insurance. Lin and Prince find a modest impact of Partnership programs, with stronger responses among those with more income and wealth (2013) and among those with financial bequest motives, higher financial literacy, and program awareness (2016). Previous work has also estimated the supply-side restrictions that underwriting practices place on the long-term-care market (Murtaugh, Kemper, and Spillman 1995; Hendren 2013). However, to date, no published studies explicitly examine underwriting as a key factor in determining the heterogeneous effect of tax and Partnership incentives on LTCI purchase. By looking at the differing effects of these incentives across risk levels, we can better understand how well the policies address the goal of protecting individuals who are most at risk of needing long-term care from financial risk. Furthermore, because high-risk individuals are the group most likely to qualify for Medicaid long-term-care coverage, we can get a clearer forecast of how a policy is likely to affect eventual Medicaid expenditures.

Tax incentives and Partnership programs have been promoted as a way to generate savings to Medicaid, which shoulders much of the public cost of long-term care. We hypothesize that the difference between high- and low-risk buyers in their response to incentives results in smaller-than-expected savings. To illustrate the point that underwriting affects Medicaid savings, we simulated the effect of tax incentives and Partnership programs on budget forecasts.

METHODS

Identification Strategy and Econometric Model

We used a difference-in-differences approach to examine the effect of policy changes on LTCI purchasing. The general specification is as follows:

$$\text{LTCI}_{ist} = \gamma_0 + \gamma_1 P_{st} + \gamma_2 P_{st} \times U_{ist} + \gamma_3 U_{ist} + \beta X_{ist} + \omega_t + \sigma_s + \varepsilon_{ist} \quad (1)$$

The outcome variable, LTCI_{ist}, is an indicator that individual i residing in state s has long-term care insurance coverage in year t. The P_{st} variable is a binary indicator of whether state s had an active policy incentive—either tax subsidy or Partnership program.

Because states implemented their tax subsidies and Partnership programs in different years, we can include state and year fixed-effects, σ_s and ω_t, to control for state-specific levels of insurance and national time trends in insurance rates. Our preferred specification also includes within-person fixed-effects, controlling for time–constant characteristics of individuals in the

sample. The assumption we made to identify the causal effect of policies was that there were no excluded events that are correlated with the introduction of a tax incentive or Partnership program in that person's state that would have caused changes in his or her probability of holding long-term care insurance. For instance, if states offered incentives to counteract an anticipated decrease in demand, that would bias the estimated effect down from the true value. Alternatively, if industry representatives successfully lobbied the state legislature and that coincided with increased marketing and outreach activities, then that would exert upward bias on the perceived effect of the policy.

In equation (1), the variable U_{st} is a continuous measure between 0 and 1 of an individual's probability of being approved in the medical underwriting process for long-term care insurance. The average effect of the policy for an individual with underwriting approval score U is the derivative with respect to P, denoted as $\gamma_1 + \gamma_2 \times U_{ist}$. In alternate specifications, U is a vector of four binary variables indicating the quartiles of the individual's predicted probability of being approved by underwriters for long-term care insurance from "very low" (bottom quartile of approval probability) to "very high" (top quartile of approval probability).

We constructed our measure of an individual's probability of being approved to buy insurance using a dataset of over 15,000 decisions by underwriters in two American long-term care insurance firms. We estimated a multivariate model with characteristics commonly used in medical underwriting decisions that are also available in the Health and Retirement Study (HRS) data: demographic and socioeconomic characteristics, cognitive and functional abilities, diagnosed health conditions, previous use of health care, health behaviors, and body mass index (BMI). The coefficients estimated from the dataset of insurance applicants were then applied to the HRS responses to generate a predicted approval probability for each HRS respondent. The variables and model estimates are fully described in Cornell et al. (2016).

Standard errors are clustered at the state level. Time-varying individual characteristics, X_{ist}, include controls for age, income and assets, education, race, marital status, number of children, and retirement status; as well as state-level factors: nursing facility occupancy rates, nursing home beds per person over age 65, percent of the state population over age 65, and a Medicaid generosity composite measure of a state's asset and income retention rules and nursing home reimbursement rate.

We also estimated the effect of the after-tax price of $1 of long-term care insurance, where differences in the generosity of state subsidies cause variation in the realized price of insurance. After-tax prices by state and year were

determined using marginal state tax rates, calculated with the National Bureau of Economic Research TaxSim Calculator (Feenberg and Coutts 1993; Feenberg 2013). We estimated the following equation:

$$\text{LTCI}_{ist} = \lambda \text{PRICE}_{ist} \times \text{UNDERWRITING}_{ist} + \text{UNDERWRITING}_{ist} + \beta X_{ist} + \omega_t + \sigma_s + \varepsilon_{ist} \quad (2)$$

In this model, PRICE_{ist} varies by state and year with the implementation of the tax subsidy and its generosity, that is, credit or deduction, percent of premium that is subsidized, and allowed maximum, as well as the individual's marginal state tax rate. Estimates of λ will be biased in an ordinary least squares regression if individuals' demand for insurance is endogenous to their marginal tax rates in ways that are not captured. For instance, households with high financial literacy that also place a high value on insurance may take steps to reduce their marginal tax rate. To address this potential bias, we followed previous work (Currie and Gruber 1996; Goda 2011) by simulating the after-tax price of long-term care insurance in each state and year for a nationally representative sample of households in the target-age range, and we use the average of this simulated price as an instrumental variable (IV) to predict variation in individuals' realized price of $1 of long-term care insurance. Because the average price is calculated for the same group of individuals in each state, the only variation comes from changes in tax policy. This IV estimate isolates the changes in demand for long-term care insurance that is attributable to changes in generosity of the tax policy, independently of potential confounders. We describe the calculation of tax price and the two-stage estimation procedure and show some checks of our instrumental variable assumptions in the Appendix SA2, section 5.

Following Lin and Prince, we also estimated the interaction of the Partnership indicator with the individual's household wealth level. The asset levels are designated as low (0–50 percentile, up to $171,000 in household assets in 2013 dollars), medium (50–80 percentile, up to $588,000), and high (80–100 percentile, up to $117,399,000). In the Partnership model, we estimate the following equation:

$$\text{LTCI}_{ist} = \gamma_0 + \gamma_1 P_{st} + \gamma_2 P_{st} \times U_{ist} + \gamma_3 U_{ist} + \gamma_4 W_{0-50} P_{st} + \gamma_5 W_{50-80} P_{st} + \gamma_6 W_{80-100} P_{st} + \beta X_{ist} + \omega_t + \sigma_s + \varepsilon_{ist} \quad (3)$$

In this model, the partial derivative with respect to the Partnership indicator is the policy effect conditional on underwriting score U and wealth level W. In sensitivity checks, we estimated models including both tax and Partnership policies in the same model. Adding both policy variables resulted in negligible (<1 percent) changes to our estimates of the key parameters.

Data and Sample

The data used in this analysis come from the Health and Retirement Study (HRS), a biennial panel survey of U.S. residents over age 50 and their spouses (Health and Retirement Study 2012). We used the publicly available version of these data available from RAND, a respondent-level database with consistent variable naming and imputations for wealth and income (RAND 2015), together with restricted identifiers for state of residence, which we obtained from the HRS. We used the state identifiers to merge survey data with tax policies, which were obtained from Stevenson, Frank, and Tau (2009) and Partnership information, obtained from the American Association for Long-Term Care Insurance website (2016).

The analysis samples were limited to respondents between the ages of 50 and 69 because the HRS is a representative population sample only for the 50-and-over population, and few insurance firms market their products to customers over age 70, instead steering them away from long-term care insurance products before they even submit an application to the underwriting process. We used population weights provided by the HRS, calculated to correspond to the Current Population Survey.

Different samples were used for each of the two policies evaluated in this study. The tax incentive analysis sample is limited to HRS waves 3–8 (survey years 1996–2006), because the bulk of policy changes occurred within this time span. We excluded self-employed persons, whose tax treatment of health insurance premiums differs, as well as individuals residing in a nursing home at the time of the interview. State-level data on the population over age 65, nursing facility occupancy rates, and nursing home beds per 1,000 people age 65 and over were included. The final sample included 53,503 observations on 16,080 unique respondents. In the individual fixed-effects model, respondents with only one observation were dropped, leaving 50,708 observations on 13,285 respondents. In Table 1 we show population-weighted mean characteristics of the samples. Across waves, 10 percent of respondents in each year have long-term care insurance, on average. Twenty-three percent of responses occur in a state and

Table 1: Summary Statistics

	A. Tax Incentive Analysis				*B. Partnership Analysis*			
	Mean	*SD*	*Min*	*Max*	*Mean*	*SD*	*Min*	*Max*
Has LTC insurance	0.10	(0.30)	0	1	0.11	(0.31)	0	1
Underwriting approval probability	0.56	(0.31)	7.5e-06	0.97	0.54	(0.32)	7.5e-06	0.97
Partnership					0.51	(0.50)	0	1
Tax subsidy	0.23	(0.42)	0	1				
After-tax price $1 LTCI	0.98	(0.099)	−0.059	1				
Assets (USD1000)	354.4	(909.8)	−3637	90,648	466.0	(1152.1)	−2246	90,648
Income (USD1000)	65.8	(106.7)	0	7,904	86.4	(253.7)	0	25,360
Female	0.55	(0.50)	0	1	0.52	(0.50)	0	1
Married	0.70	(0.46)	0	1	0.68	(0.47)	0	1
Age	59.4	(5.09)	50	69	59.7	(5.01)	50	69
College or above	0.23	(0.42)	0	1				
Years of education					13.3	(2.91)	0	17
Number of living children	3.08	(2.01)	0	20	2.84	(1.89)	0	19
Hispanic	0.077	(0.27)	0	1	0.085	(0.28)	0	1
African American	0.10	(0.31)	0	1	0.11	(0.31)	0	1
Retired	0.31	(0.46)	0	1				
Self-reported health	2.71	(1.14)	1	5	2.69	(1.11)	1	5
Difficulty with 1 + ADL	0.12	(0.32)	0	1				
Body mass index					28.7	(6.04)	7	83
Years	1996–2006 (HRS waves 3–10)				2002–2012 (HRS waves 6–12)			
Observations	53,503				57,403			
Unique respondents	16,080				19,139			

Notes. Statistics are calculated with population weights furnished by the Health and Retirement Study, which are calibrated to correspond to the U.S. community-dwelling population. To facilitate fixed-effects analysis, each individual is assigned a constant weight forward from their first interview year that they appear in the sample. Self-reported health is an ordinal measure 1–5, with 1 being excellent and 5 being poor.

year where there is either a tax credit or deduction for LTCI. In states and years where a tax incentive is in effect, the median after-tax price was $0.975, with 25 percent of individuals paying $0.95 on the dollar; and among those who actually purchased LTCI, the median after-tax price was $0.966, with 25 percent of individuals paying $0.90 on the dollar.

With the exception of four pilot states that implemented Partnership programs in 1994, state policy changes in the Partnership program occurred in 2006 and later. Therefore, we restricted the sample for this analysis to waves 6–12 (sample years 2002 through 2012). Here, we also restricted the sample to ages 50–69, for a final sample size of 57,403 observations on 19,139 individuals. Forty-seven percent of the sample has experienced the implementation of the Partnership program.

Medicaid Simulation

We used the results in this study and results from the literature to simulate the effect of policy changes on Medicaid expenditures. We simulated the impact of providing an incentive conditional on wealth decile; gender; and underwriting class, which we assigned to low-risk (high probability of approval) or high-risk (low probability of approval). We showed how the estimated expenditures from a naïve model, not conditioned on risk types, differ from estimates generated by a model that allows variation by approval probability. Simulation models were created in Excel. The models and inputs are described in detail in the online appendix to this study.

RESULTS

Tax Incentives

The results of the regression described in equation (1), with the presence of a state tax incentive as the policy treatment, are summarized in Table 2. They confirm that the impact of tax incentives on long-term care insurance coverage is significantly altered by the underwriting scores of consumers. Model (1) reflects Goda's preferred specification and is similar in direction and order of magnitude to her main result; it suggests that the presence of a tax incentive (credit or deduction) increases participation in private long-term care insurance by 1.8 percentage points (approximately an 18 percent increase from the average 10 percent prevalence of LTCI). Models (2) and (3) estimate the interaction effect of tax subsidy and approval probability. The state fixed-effects estimate (Model 2) suggests that the effect of the tax subsidy is 0.1 percentage point greater with every 0.1 increase in an individual's probability of approval (not statistically significant). In the individual fixed-effects model, the coefficient on the interaction term is 0.0587 ($p < .01$). In our model, the effect of the tax policy is equal to

Table 2: Effect of a Tax Incentive on Purchase of Long-Term Care Insurance

	P = Presence of Tax Incentive					*P = After-Tax Price of $1 of LTCI*				
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Tax incentive or tax price (P)	0.0180*	0.0138	−0.0129			−0.132***	0.0364	0.0596		
	(0.00948)	(0.0108)	(0.00965)			(0.0399)	(0.166)	(0.102)		
P × Approval prob		0.00919	0.0587**				−0.250*	−0.421***		
		(0.0194)	(0.0232)				(0.151)	(0.132)		
P × Very low approval				0.0128	−0.000942				0.0630	0.0210
				(0.0101)	(0.00924)				(0.182)	(0.101)
P × Low approval				0.0227*	0.00586				−0.0990	−0.114
				(0.0127)	(0.0107)				(0.113)	(0.0870)
P × High approval				0.0173	0.0285**				−0.125	−0.239***
				(0.0120)	(0.0123)				(0.0891)	(0.0719)
P × Very high approval				0.0211**	0.0362**				−0.177**	−0.276***
				(0.00967)	(0.0151)				(0.0734)	(0.0755)
Approval prob		0.00743	−0.00593				0.250*	0.420***		
		(0.00715)	(0.0122)				(0.149)	(0.131)		
Low approval				0.00711	0.0177***				−0.242*	−0.304***
				(0.00510)	(0.00625)				(0.138)	(0.108)
High approval				0.00697	0.0131*				−0.0745	−0.152
				(0.00536)	(0.00757)				(0.0840)	(0.0990)
Very high approval				0.00344	0.00309				−0.0489	−0.0284
				(0.00556)	(0.00892)				(0.0695)	(0.0760)

Continued

Table 2. *Continued*

	P = Presence of Tax Incentive					*P = After-Tax Price of $1 of LTCI*				
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Model	DID	DID	DID	DID	DID	IV	IV	IV	IV	IV
State time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Individual fixed effects	Yes	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	53,503	53,503	53,503	53,503	53,503	53,501	53,501	53,501	50,708	50,708

Notes. Standard errors in parentheses. All models include state and year fixed effects and controls for wealth, demographics, and state-level factors, as described in the methods section. Each column is a separate regression model. In models 1 to 5, P is a change from 0 to 1, indicating the presence of a state tax credit or deduction in that year and state, and coefficients are interpreted as the effect of having any tax incentive. In models 6 to 10, P is the simulated after-tax price of $1 of insurance, and coefficients are the IV estimate of the effect of an increase in the after-tax price of LTCI. In Models 4, 5, 9, and 10, levels correspond to quartiles of approval probability, from very low representing the bottom quartile (approval probability up to 0.15), low (up to 0.54), high (up to 0.77), to very high (up to 0.97).
$^{*}p < .1$, $^{**}p < .05$, $^{***}p < .01$.
DID, difference-in-difference; IV, instrumental variable.

(−0.0129 + Underwriting × 0.0587), so high-risk individuals with an underwriting score of 0.25 would expect to increase their LTCI purchase by 0.002 in response to the tax subsidy, while low-risk persons with underwriting scores of 0.75 would increase their LTCI purchase by 0.031. At average LTCI rates of about ten percent, those changes represent approximately 2 percent and 30 percent increases from the mean, respectively.

Tax Price

Models (6–10) in Table 2 give the instrumental-variable estimates of the effect of tax price on long-term care insurance coverage, in state fixed-effects and person fixed-effects models. Model (6) is compared to the main result found by Goda (2011). Models (7) and (8) suggest that that the level effect of tax price is more strongly negative with higher approval probability—an effect that is statistically significant ($p < .01$) in the individual fixed-effects model. Models (9) and (10) suggest, furthermore, that the effect intensifies with increasing approval probability. In the individual fixed-effects model, among those whose probability of approval is in the highest quartile, a $1 increase in the price of $1 of long-term care insurance decreases the rate of insurance purchase by 0.276 percentage points. Given the prevalence of long-term care insurance in this group of about 12 percent (see Table 2), that estimate suggests that a 1 percent increase in premium prices decreases the insurance holding by 2.3 percent among the high-approval group (i.e., 0.00276/0.12=2.3).

Long-Term Care Partnership

The results for the effect of the Partnership program are displayed in Table 3. Lin and Prince (2013), in their preferred model that disaggregates by wealth group, show that only the high-wealth households (those above the 80th percentile of total wealth) respond to Partnership incentives. Following Lin and Prince (2013), Model (1), with individual fixed effects, estimates the effect of the Partnership separately by asset group plus an additional wave of survey data from 2012. (See Appendix SA2 for sensitivity analyses excluding the 2012 data.) Similarly to their findings, the overall model finds that the Partnership program appears to increase long-term care insurance purchase only among individuals with the highest assets, a 3.9 percentage point increase in LTCI purchase, while among the medium- and low-asset groups, the effect is not statistically different from zero or even negative.

Table 3: Effect of Partnership on Long-Term Care Insurance Purchase

	(1)	(2)	(3)	(4)	(5)
Partnership LTCI Program (P)		0.003 (0.006)	−0.016** (0.007)		
P × Low assets	−0.015** (0.007)			−0.024*** (0.008)	
P × Med assets	0.002 (0.007)			−0.010 (0.007)	
P × High assets	0.039*** (0.008)			0.026*** (0.007)	
P × Approval probability			0.035*** (0.011)	0.019* (0.010)	
P × Very low approval					−0.008 (0.008)
P × Low approval					−0.005 (0.006)
P × High-approval					−0.001 (0.007)
P × Very high-approval					0.018** (0.009)
Mid assets	−0.000 (0.006)	0.008 (0.005)	0.008 (0.005)	0.001 (0.006)	0.008 (0.005)
High assets	−0.019** (0.009)	0.007 (0.007)	0.007 (0.007)	−0.017* (0.009)	0.007 (0.007)
Underwriting approval probability		−0.000 (0.009)	−0.018 (0.012)	−0.011 (0.011)	
Individual fixed-effects	Y	Y	Y	Y	Y
Years included	2002–2012	2002–2012	2002–2012	2002–2012	2002–2012
Observations	57,403	57,403	57,403	57,403	57,403

Notes. Standard errors in parentheses. Data are from the HRS, 2002–2012. Levels of approval probability are quartiles of approval score (see note, Table 2). Asset levels are designated with cut points at the 50th and 80th percentiles of the sample, $177,000 and $588,000, respectively.
*$p < .1$, **$p < .05$, ***$p < .01$.
P, presence of a state Partnership program.

The overall (noninteracted) effect of the Partnership program is 0.003 and not statistically different from zero, a finding that is consistent with previous research. However, when the Partnership variable is interacted with underwriting approval in Model 3, there is a strong modifying effect of underwriting on the policy variable. Underwriting is an important modifier of the program effect, with a coefficient of −0.016 on the Partnership main effect ($p < .05$) and positive .035 on the interaction term ($p < .01$). In Model 5, where effects are allowed to vary with each level of underwriting approval, the policy effect is negative (although not significantly different from zero) among those least likely to be approved, and the effect of the policy is increasingly positive with higher likelihood of underwriting approval.

Simulation of the Impact of Policy Incentives on Medicaid Costs

Figure 2 shows the net savings (expenditures) in dollars per 65-year-old at different wealth deciles and overall, as calculated from the pooled model, high-risk individuals, and low-risk individuals. We ran the simulations under three scenarios: pooled (where response to policies and LTC expenditures is assumed to be constant across values of approval probability), low-risk (high-approval probability), and high-risk (low approval probability). We set approval probability for the low-risk group at $U = 0.75$ and for the high-risk group at $U = 0.25$. For both policies, individuals in lower wealth deciles generate more savings while those in higher deciles generate costs. In the tax simulation, the pooled analysis predicts that a 65-year-old would generate an additional $38 in state Medicaid savings. When responses and LTC use are allowed to vary, however, low- and high-risk models both predict higher per-person costs than the pooled model: Individuals in these groups would generate additional $104 and $128 in state Medicaid expenditures, respectively.

In the Partnership simulation, the pooled analysis suggested an average cost per individual of $63. Predictions for high- and low-risk types bracketed this figure at $26 and $84 in additional costs, respectively.

DISCUSSION

Policy Effects

This analysis explicitly examines how medical underwriting may constrain the response of long-term care insurance buyers to incentives for insurance purchase, a novel contribution to the literature on the LTC insurance market.

Figure 2: Cost Offsets Available to Government from Introduction of a Tax Incentive or Partnership Subsidy [Color figure can be viewed at wileyonlinelibrary.com]

Our results show that people's response to incentives is closely associated with their health status and likelihood of approval by insurance underwriters. Those who may be most at risk of needing long-term care are the least likely to take advantage of state policy incentives because the supply-side forces shut them out of the market completely. Overall, the more likely an individual is to qualify for long-term care insurance, the greater their response to state incentives. The trend holds when the response is allowed to vary by quartile, which would capture any nonlinearity in the interaction effect.

Although wealth and underwriting approval are strongly correlated, the overall results are robust to the inclusion of controls for income and

assets. It is worth noting that in our models, underwriting probability per se does not appear to have an effect on insurance purchase. One possible explanation is that demand tracks inversely with risk. That is, low-risk individuals who have high approval scores also are less inclined to buy insurance and vice versa.

Medicaid Simulation

To better lay out the intuition behind this result, we can imagine a simplified market consisting of two consumers: a high-risk and a low-risk person. Neither person wants insurance at the market price, but both are willing to purchase it when subsidized. The naïve, pooled model assigns the same average underwriting score to both individuals, and both are able to purchase tax-subsidized LTCI. Suppose the high-risk person subsequently needs several years of nursing home care. Because a portion of that care is offset by his or her insurance policy, substantial savings are generated for Medicaid, which would otherwise pay for care after the high-risk person's household savings were exhausted.

In the underwriting simulation, by contrast, the high-risk person receives poor marks from medical underwriters and is unable to buy insurance at any price. The low-risk person buys the subsidized insurance. The government not only pays the foregone tax revenue for the low-risk person but also pays the full cost of the high-risk person's nursing home care. The theoretical government savings from tax exclusions for LTCI in the naïve model come from assumptions that the high-risk consumers, who would otherwise spend down to Medicaid, are able to buy LTCI. In the model that recognizes that high-risk individuals are constrained due to underwriting rules, the subsidy induces only low-risk individuals to buy insurance. The hoped-for Medicaid savings on high-risk buyers disappear, and net expenditures are negative. Our simulations suggest that a statewide tax incentive encourages LTCI purchase among people with both the highest marginal tax rate (therefore, the most foregone tax revenue) and the lowest LTC risk (and therefore, the lowest probability that they would have needed Medicaid-paid LTC in the absence of private insurance).

In our Partnership simulation, all scenarios predicted net costs to state government, with the pooled analysis predicting costs in between the high- and low-risk types. Our finding suggests that forecasts of Partnership effects on state budgets may be less sensitive to underwriting assumptions than tax incentives.

Limitations

A few limitations are important to note. First, though the inclusion of individual fixed-effects controls for time-constant factors that might be correlated with insurance purchase, the policy estimates could still be biased by economic or policy changes within states that correlate with the introduction of tax benefits or Partnership policies. The observed response in insurance purchase may not be attributable to changes in price or Partnership directly, but instead to marketing and outreach from sellers and represent a one-time response.

Some important information about insurance purchase is lacking in the data. The HRS does not include any information on whether individuals bought their policies through the private market or through employer-sponsored LTCI programs, where underwriting requirements are generally less strict. We also do not observe the actual premium prices that individuals would be quoted based on their health status. Many firms offer spouse or companion discounts and charge higher premiums to individuals who receive a substandard underwriting score. The low response of high-risk individuals to policy incentives could be explained not only by lack of access but also the higher pretax prices.

Predicted underwriting scores represent estimates from underwriting decisions on a pool of applicants that self-selected and had already undergone field-underwriting review on the part of insurance agents. Imputed scores therefore represent a hypothetical probability that an individual will be able to purchase insurance, conditioned on his or her desire to seek it out and the affordability of the insurance product. As an aggregate measure of health status, it may represent consumer-side factors at play, beyond the underwriting behavior of insurance companies. For instance, even though the models include controls for both income and assets, individuals with low underwriting scores who are in poor health may have higher out-of-pocket medical expenses than healthy individuals, making LTCI premiums unaffordable for them.

To demonstrate the importance of considering underwriting in forecasting Medicaid spending, we presented a stylized simulation of Medicaid expenditures. We estimated costs for prototypical high- and low-risk individuals of varying wealth levels, where a more complex model could draw from the full sample distribution. Some simplifying assumptions were necessary, such as the difference in long-term care costs between individuals of high and low risk types, because data are lacking on the

LTCI experience of high-risk individuals who are, for the most part, excluded from the market. The resulting estimates were not representative of any particular state but assumed national averages for policy response, marginal tax rates, and Medicaid's share of expenditures.

CONCLUSIONS

Adverse selection in the market for long-term care insurance leads insurers to impose strict medical underwriting requirements. Those restrictions mean that long-term care insurance is actually available only to a narrower slice of Americans who are not only wealthy enough to afford the premiums, but also healthy enough to be at low risk of current or near-future need for the services covered by the insurance. Our results imply that responsiveness of demand for long-term care insurance to policy incentives needs to be interpreted in light of medical underwriting. Standard elasticities reported in previous research represent average effects across some individuals who would have no access to insurance at any price, even if they could afford it. Measuring heterogeneous effects gives a more accurate prediction of how different groups might respond. Where previous work has also looked at modifying variables, such as education and wealth, our analysis suggests that those characteristics could be proxies for the barriers to access that underwriting practices put in place. What seemed like a consumer-driven difference may, rather, be a supply-side phenomenon.

Policy makers continue to promote LTCI through tax incentives, Partnership programs, and encouragement campaigns. Among the market reforms suggested by the Senate Commission on Long-Term Care were to allow purchase of long-term care insurance with pretax dollars and to encourage financial products that combine annuities and long-term care insurance, balancing opposing risks (2013). But without addressing the underlying adverse selection issues that exclude a large portion of the population from being able to buy insurance at all, those types of reforms are unlikely to accomplish either the goal of protecting Americans from potentially catastrophic long-term care costs, or substantially offsetting Medicaid expenditures. Our findings are consistent with recent policy simulations that find negligible savings to Medicaid from subsidies to the voluntary market (U.S. Government Accountability Office 2007; Favreault et al. 2015). We suggest that with explicit accounting for the heterogeneous response due to underwriting, models would be even more pessimistic in their predictions. Although it

is possible that firms might relax underwriting rules in response to subsidies in order to expand the market, the underlying dynamics of adverse selection and information asymmetries still make the market segment less attractive than it might otherwise be.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.

Appendix SA2: The Impact of Policy Incentives on Long-Term Care Insurance and Medicaid Costs: Does Underwriting Matter?

Appendix SA3: Tax Incentive Simulation and Calculations.